

EFFECT OF FLY ASH /POND ASH IN IRRIGATED VERTISOLS ON GRAIN YIELD AND MICRONUTRIENT CONTENT IN MAIZE AND SUNFLOWER

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SUMMARY

Application of fly ash / pond ash at maximum dose significantly increased the concentration of micronutrients in sunflower and maize grains. Further, combined application with FYM at 20 t/ha increased the micronutrient content due to increased solubility of metal ions by forming stable complexes with organic legends. The per cent increase in the concentration of micronutrients in sunflower seeds over control due to application of fly ash @ 40 t/ha varied from 0.7 to 20.8 per cent in Zn, 1.4 to 14.2 per cent in Mn, 0 to 4.3 per cent in Cu and 0.7 to 63.9 per cent in Fe. Similarly. in the succeeding maize grain, the same varied from 5.1 to 34.0 per cent in Zn, 0 to 3.4 per cent in Mn, 17.6 to 34.7 per cent in Cu and 2.4 to 4.0 per cent in Fe.

Key words : Fly ash, Pond ash, Micronutrients, Maize, Sunflower.

The annual fly ash generation in India is expected to exceed 120 million tones by 2010 from the present generation of 80 to 100 million tones annually. At present, only small percentage (13-15%) of fly ash generated in India is being used in cement, ceramic, brick industries and also in asphaltting of road, filling of low levels etc. and the remaining ash is dumped into large ponds near the thermal plants. Such a huge quantity of ash stored in ponds holds a potential threat to the environment if not controlled effectively.

In an attempt to find a solution for disposing of this huge quantity of fly ash scientists all over the world characterized the fly ash from different sources from agricultural point of view and reported that fly ash contained higher proportion of silt sized particle with high water holding capacity. The composition of fly ash is dominated by Si, Al, Ca and Fe followed by K, S and Mg. Abundance of most of the trace elements are comparable to earth's crust (Fisher *et al.*, 1976). The results of studies conducted world wide have clearly indicated that for most soils, addition of fly ash input would alter the mechanical composition towards increasing silt content, decrease bulk density, increase water holding capacity and improve nutrient availability (Chang, *et al.*, 1997; Campbell *et al.*, 1983; Martens, 1971), which resulted in higher crop yields. The present investigation was aimed at characterization of fly ash from RSTPS Shakthinagar, Raichur and to study the effect of bulk and long term fly ash/pond ash application on maize and sunflower yield and micronutrient content of their grains.

MATERIALS AND METHODS

Fly ash samples were collected from RSTPS, Shakthinagar, Raichur, (Karnataka) during 2004 to 2006. Both fly ash and pond ash were used in the study. Fly ash was collected directly from the hopper inside the plant and pond ash was collected from the ash pond at the lowest point. Both ashes were analyzed for various physico-chemical parameters like, particle size, water holding capacity, bulk density, pH, EC, organic carbon and available N, P and K contents by following standard procedure recommended for soil. The contents of micro nutrients such as Fe, Cu, Mn and Zn were extracted using 0.005 M DTPA and the concentration in the solution was determined using atomic absorption spectrophotometer. The total elemental concentration of Fe, Mn, Cu and Zn was determined after digesting the sample with HF + HClO₄ acid mixture.

Field experiments were conducted to study the response of maize and sunflower to fly ash application to the irrigated vertisol. The treatment consisted of different levels of fly ash (@ 30 and 40 t/ha) applied individually or in combination with FYM at the rate of 20 t/ha. Crops were raised by following recommended package of practices. After harvesting at maturity the yield was recorded and expressed in q/ha. However, the results of only relevant treatments are presented and discussed.

RESULTS AND DISCUSSION

Effect of FA/PA on crop yield :

A worth noticing response for both the ashes at 30 and 40 t/ha over control has been observed in the grain and straw yields of sunflower and maize, as evidenced from the results obtained on grain yields (15-45% increase)